

**Sampling Protocols
In Response to Gold King Mine Spill**

Release Monitoring Project Plan

Prepared by
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Mountain Studies Institute (MSI) is responding to the Gold King Mine release to the Animas River that occurred on August 5, 2015. The plume of sediment and metals from the mine left the Gold King Mine site approximately 10 AM on August 5th, entered the Town of Durango approximately 8 PM on August 6th. Before the plume reached the downtown Durango, MSI collected several samples to establish baseline conditions immediately prior to the plume. MSI has contributed to collaborative efforts to monitor the Animas River for over a decade incorporating different parameters to document changes in water quality, nutrients, and macroinvertebrates.

This document captures the immediate response of MSI to document the event in the immediate short-term and long-term impacts. Please direct all questions to Aaron Kimple, Program Director for Water Quality and Forest Health akimple@mountainstudies.org, 970-749-7916. For macroinvertebrate questions, contact Scott Roberts at scott@mountainstudies.org, 865-382-2993.

Purpose:

- To measure the total recoverable metals in the Animas before, during, and after pollution pulse
- To measure invertebrate populations before and after the pollution pulse

Justification

- Independent monitoring pre and post water quality
- Monitoring in Silverton and Durango
- Collaborate with monitoring to the confluence with the San Juan with partners, NM
- Paired water quality monitoring with invertebrate sampling
- Comparison with historic invertebrate populations monitoring locations for long-term trend analysis

Sampling Locations, Methods, and Frequency

Pre Release Monitoring: 8/6/15:			
Site	WQ	Macro	Photo
Rotary Park, Durango	Hourly	Once	With samples
32 nd Bridge, Durango	No	Once	With samples

During Plume Monitoring: 8/6/15:			
Site	WQ	Macro	Photo
Rotary Park, Durango	Half-hour	Drift net	No (after dark)

Post Plume Monitoring: 8/7/15- ongoing:			
Site	WQ	Macro	Photo
Rotary Park, Durango	Every 6 hours	20 hours past event, 48 hours until water quality parameters stabilize; fall sampling	With samples
32 nd Bridge, Durango	No	20 hours past plume event, 48 hours until water quality parameters stabilize	With samples
Silverton- Animas above Cement Confluence (reference)	No	72 hours past plume event; fall sampling	With samples
Silverton- Animas below Mineral Confluence (affected)	No	20 hours past plume event; fall sampling	With samples
2014 Sampling Locations	No	Fall sampling	With samples

All sample locations were known sample locations, with the exception of the Rotary Park location. At Rotary Park, samples were pulled from a rock along the east bank of the Animas River approximately 32m downriver of the walking bridge north of Rotary Park in Durango, CO. The coordinates are: **37°16'50.22"N 107°52'35.98"W**

Figure 1: Rotary Park Location



Project Management

The project will be co-managed by Aaron Kimple and Scott Roberts, MSI Program Director and Aquatic Biologist respectively.

Name	Organization	Position/Role	Responsibility for	Contact Information
Aaron Kimple	MSI	Project Manager, Lead Sampler	Coordinate field sampling, sampling plan, data management, and reports	(970) 387-5161/(970) 749-7916 akimple@mountainstudies.org
Scott Roberts	MSI	Co-Manager, Aquatic Ecologist	Coordinate BMI sampling, data management, reports	(970) 387-5161/(865)-382-2993 scott@mountainstudies.org
Marcie Bidwell	MSI	Executive Director	Assist in QAPP preparation, report data, quality assurance	(970) 387-5161/(970) 426-8863 marcie@mountainstudies.org
ADD OTHERS				
Emma Lee Deyo	SJ SWCD, NM	Senior Project Manager	Manage and oversee grant finances and contracts	(505)334-3090 x108 emma.deyo@sanjuanswcd.com
Melissa May*	SJ SWCD, NM	Project Manager	Prepare QAPP, coordinate project	(505)334-3090 x109 melissa.may@sanjuanswcd.com
David Tomko*	SJWG, NM	Watershed Coordinator	Assist in QAPP preparation, provide historic data, and collect data	(505) 632-8008 jtomko73@msn.com
Ann Oliver	AWP	Watershed Coordinator	Report data, coordinate citizen involvement and outreach	(970) 903-9361 annsoliver@gmail.com

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Methodology

Methods used in the field for water quality sampling will follow Standard Operating Procedures (SOPs) published by Colorado Department of Public Health and Environment, and recommended by Green Analytical Laboratories. Macroinvertebrate sampling will follow methods utilized in past studies and CDPHE methods.

Initial Monitoring August 6th, Pre-Plume:

Collect samples hourly to make sure the beginning of the spill is detected.

Kick sample at historic location and water quality sampling location

Drift sampling at water quality sampling location

Secondary Monitoring August 6- August 7th once Plume Detected:

Once spill is identified in sampling location sample every 30 minutes to measure rate of progress

Measure 1 drift sample

Tertiary monitoring August 7- ongoing

Collect water samples four times (6 hour interval) a day until orange color is gone from the river.

Long-Term Monitoring

Sediment deposition in the Animas from the plume has the potential to contribute loading for years into the future. Understanding sediment and contaminate deposition will help in the understanding of future impacts. MSI recommends that sediment deposition and transport be monitored.

Water Quality Sampling Grab Samples.

Water was collected in 1L bottles. Bottles were rinsed three times with water gathered from the current of the river and then a sample was collected and capped. No stabilizers were included in the bottle and the bottles were stored at room temperature. Treatment of samples was done following protocols identified by Green Analytical Laboratories, Durango, CO.

Drift Sampling

A triangular net was placed in the current of the river for two 5 minute time periods (total of 10 minutes). Insects gathered were placed into a sample jar and nets were rinsed to make sure all insects were collected.

Kick Sampling

In order to allow direct comparison to the historical Animas River BMI dataset, we replicated a BMI sampling method (to the greatest extent possible) that was developed by Chester Anderson and used previously on the Animas River (Anderson 2007; personal communication). Anderson's method utilizes and modifies protocols developed by the Environmental Protection Agency (Barbour et al. 1999) and Colorado Department of Public Health and Environment (CDPHE 2010).

Anderson (2007) assessed a variety of BMI sampling methods and determined that the most appropriate method for use in the Animas River was a targeted riffle method that utilizes a modified rectangular dip net coupled with a dolphin bucket. The size of the net opening is 46 cm by 25 cm or 0.115 m² (178 in²). We implemented this methodology using the same rectangular dip net used in Anderson's previous Animas River BMI sampling. Each sample was collected by placing the net securely on the bottom of the river with the net opening facing upstream. A biologist stood downstream of the net and disturbed the substrate on the river bottom that was immediately upstream of the net. Substrate was disturbed by lifting and scrubbing rocks and gravel by hand for approximately 90 seconds so that benthic macroinvertebrates would be dislodged and drift downstream into the net opening. For each sample, an area of approximately 0.115 m² of substrate was disturbed, which is identical to the size of the net opening. For each site, five samples were obtained diagonally across riffle habitat within an approximately 100 meter-long section of the river. The five samples were then composited into a single sample container. Thus, 0.575 m² (890 in²) of riffle habitat was sampled at each site (0.115m² x 5 samples).

August 8: Brief Monitoring Activities Summary

MSI started pulling samples for dissolved and total heavy metals on August 6, 2015 before the plume made it to Durango. We also took invertebrate samples.

We collected water hourly until the plume arrived at 10:00pm, at which point we grabbed samples every 1/2 hour until 12:30am. We grabbed a sample at 10:00am the morning of August 7, 2015. Sampling continued every 2 hours until 6:00pm, August 7.

At 6:00pm August 7:00 MSI drew a sample using an automated sampling devise (ISCO). The ISCO is programmed to draw samples every 6 hours. The ISCO will operate until the plume has dissipated.

Drift Samples were taken prior to the plumes arrival at 2:00 pm and 9:00pm on August 6, 2015. Samples were also collected during the plume at 10:30pm August 6 and at 3:30 on August 7.

We grabbed a kick sample for invertebrates at 2 locations before the plume came and plan to do them again today and after the plume dissipates. We collected drift samples prior to the plume, when the plume arrived, and plan to do more today and until dissipation.